Qualitative Particulate Matter (PM_{10} and $PM_{2.5}$) Hot Spot Assessment for Gerald Desmond Bridge Replacement Project

Ocean Boulevard from SR-47 to the Los Angeles River
City of Long Beach, Los Angeles County

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1. INTRODUCTION

Parsons has prepared this project-level particulate matter impact assessment for the Gerald Desmond Bridge Replacement Project. The analysis is provided in response to the United States Environmental Protection Agency's (EPA) requirement for particulate matter [PM_{10} (particulate matter of diameter less than or equal to 10 microns) and $PM_{2.5}$ (particulate matter of diameter less than or equal to 2.5 microns)] hot-spot analysis, as specified in its March 10, 2006 *Final Transportation Conformity Rule* (71 FR 12468). The analysis was conducted following the procedures and methodology provided in the document *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (Guidance) [*EPA, 2006a*], developed by the EPA and the Federal Highway Administration (FHWA).

2. REGULATORY BACKGROUND

2.1 Transportation Conformity

The EPA, in conjunction with the U.S. Department of Transportation (DOT), established the Transportation Conformity Rule, as defined in 40 CFR Parts 51 and 93, on November 30, 1993. The rule implements the Federal Clean Air Act (CAA) conformity provisions. The CAA amendments of 1990 require that transportation plans, programs, and projects that are funded by or approved under Title 23 United States Code (U.S.C.) or the Federal Transit Act, conform to state or federal air quality plans for achieving NAAQS. "Conformity" is defined under section 176(c) of CAA as conforming to a plan's purpose of expeditiously attaining federal clean air standards, not causing or contributing to any new violation of a standard, not increasing the frequency or severity of any existing standard violation, and not delaying timely attainment or progress in attaining clean air standards. In determining whether a project conforms with an approved air quality plan, agencies must use current emission estimates based on the most recent population, employment, travel, and congestion estimates determined by an area's metropolitan planning organization (MPO). MPOs are required to develop and maintain 20-year Regional Transportation Plans (RTP) and 3-year Regional Transportation Improvement Programs (RTIP or TIP) that set out transportation policies and programs for the region. A conforming RTIP/TIP model outcome projects that the regulated pollutants will be reduced to acceptable levels within time frames that meet the NAAQS.

In March of 2006, EPA issued amendments to the Transportation Conformity Rule to address localized impacts of particulate matter (*EPA, 2006a*). The amendments include requirements for qualitative PM_{10} and $PM_{2.5}$ Hot-spot analysis for projects in the areas that are designated as nonattainment or maintenance areas for these pollutants. A hot-spot analysis is defined in the Code of Federal Regulations (CFR) (40 CFR 93.101) as an estimation of likely future localized $PM_{2.5}$ or PM_{10} pollutant concentrations and a comparison of these concentrations with the relevant ambient air quality standards. A hot-spot analysis assesses the local impacts, in areas near congested roadway intersections, highways ramps or transit terminals. For transportation projects, such an analysis can demonstrate that a project meets Clean Air Act conformity requirements to support State and local air quality goals with respect to potential localized air quality impacts. Only projects that are considered "Projects of Air Quality Concern" (POAQ), are required to perform hot-spot analysis.

2.2 Standards and Conformity Conditions

PM_{10} nonattainment and maintenance areas are required to attain and maintain two standards:

- 24-hour standard: 150 µg/m^3
- Annual standard: 50 µg/m3 (The annual NAAQS was revoked by EPA in September 2006, due to a lack of evidence linking health problems to long-term exposure to coarse particulate pollution [*EPA, 2006b*].)

The 24-hour PM_{10} standard is attained when the average number of exceedances in the previous three calendar years is less than or equal to one. An exceedance occurs when a 24-hour average concentration of greater than 150 µg/m^3 is measured at a monitoring site. The annual PM_{10} standard is attained if the average of the annual arithmetic means for the previous three calendar years is less than or equal to 50 µg/m^3.

A PM_{10} hot-spot analysis must consider all applicable standards, unless it is determined for a given area that meeting the controlling standard would ensure that Clean Air Act requirements are met for both standards. The interagency consultation process should be used to discuss how the qualitative PM_{10} hot-spot analysis meets statutory and regulatory requirements for PM_{10} standards, depending on the factors that are evaluated for a given project.

$PM_{2.5}$ nonattainment and maintenance areas are required to attain and maintain two standards as well. The standards are described below.

- 24-hour standard: 65 µg/m^3 (Based on 2004-2006 monitored data, EPA tightened the $PM_{2.5}$ 24-hour standard to 35 µg/m^3. The new standard became effective in December 2006, and the new area designation will become effective in early 2010 [*EPA, 2006b*])
- Annual standard: 15.0 µg/m^3

The 24-hour $PM_{2.5}$ standard is based on 3-year average of the 98^{th} percentile of 24-hour recorded concentrations; the annual standard is based on 3-year average of the annual arithmetic mean $PM_{2.5}$ recorded at the monitoring station. A $PM_{2.5}$ hot-spot analysis must consider both standards, unless it is determined for a given area that meeting the controlling standard would ensure that Clean Air Act requirements are met for both standards. The interagency consultation process should be used to discuss how the qualitative $PM_{2.5}$ hot-spot analysis meets statutory and regulatory requirements for both standards, depending on the factors that are evaluated for a given project.

3. PROJECT DESCRIPTION

The Port of Long Beach (Port) is proposing to replace the existing physically and functionally deficient Gerald Desmond Bridge with a structurally sound and seismically resistant structure that would meet vehicular and shipping needs for its planned 100-year design life. The bridge replacement would also necessitate reconfiguration of freeway interchanges within the project limit and some arterial street intersections. The proposed improved bridge would provide vertical clearance that would allow the passage of some existing container ships and new-generation vessels currently being constructed.

The project site is located in the southwest portion of the City of Long Beach at the southern end of the Route 710 freeway in Los Angeles County. The project corridor is in the Back Channel area of the Port, centered along Ocean Boulevard, and it extends from the intersection of the Terminal Island Freeway at the western end to the easterly end of the bridge over the Los Angeles River. The southerly limit of the project is located on Pico Avenue approximately 660 feet (ft) south of the Ocean Boulevard interchange. The northerly limit of the project is along Route 710, approximately ½ mile (2,630 ft) north of Ocean Boulevard, which crosses the Back Channel over the Gerald Desmond Bridge. The Ocean Boulevard/Gerald Desmond Bridge portion of the project is located in the Port’s Middle Harbor and Terminal Island Planning Districts, and the Route 710 portion is located in the Northeast Harbor Planning District. The Gerald Desmond Bridge is one of the three bridges that connect surface highways to Terminal Island in the harbor area. Figure 1 shows the project location in both a regional and local context.

The project area is within a heavily urbanized portion of southern California. The immediate vicinity of the project is Port-related industrial uses. The combined ports of Long Beach and Los Angeles are the fifth largest container port in the world. The topography of the study area is flat and has been extensively modified through port and roadway development over the last 80 years. The Gerald Desmond Bridge was constructed in 1966 and was seismically upgraded in 1995. The existing bridge provides five 12-ft-wide travel lanes and no shoulders. It includes two travel lanes in each direction plus a third climbing lane in the uphill direction on both approaches of the bridge. The climbing lanes are dropped at the crest of the bridge. There is a transition from two to three lanes in each direction on Ocean Boulevard east of the Pico Avenue interchange and west of the Pier T interchange.

Project Alternatives

Several project alternatives were evaluated as part of the project development process. Two alternatives, including a no build and a build alternative, were identified to carry forward for full environmental impact analysis. These alternatives have been evaluated based on the project purpose and need. A brief description of each alternative is presented below.

No Build Alternative

The No Build Alternative would allow the existing bridge structure and interchanges within the project area to remain in place with the current configurations. This option would restrict traffic capacity between Route 710 and Terminal Island, and retain a physically deteriorated bridge in service. The existing Gerald Desmond Bridge would continue to be seismically inadequate and subject to damage or collapse under strong seismic conditions. Maintenance activities would continue; the bridge is expected to continue to deteriorate over time as its useful life is eroded further and as earthquakes of various magnitudes are experienced.

Identified Preferred Build Alternative (North-Side Alternative)

The North-side Alternative would provide a new bridge located approximately 120 ft (37 m) north of the existing bridge (measured from centerline). This alternative bridge alignment would provide three travel lanes in each direction along the new bridge structure with five percent approach grades. This alignment utilizes the land between the existing bridge and the Long Beach Generating Station (formerly Southern California Edison), and it would minimize impacts to the new Pier T facility located south of the existing bridge.

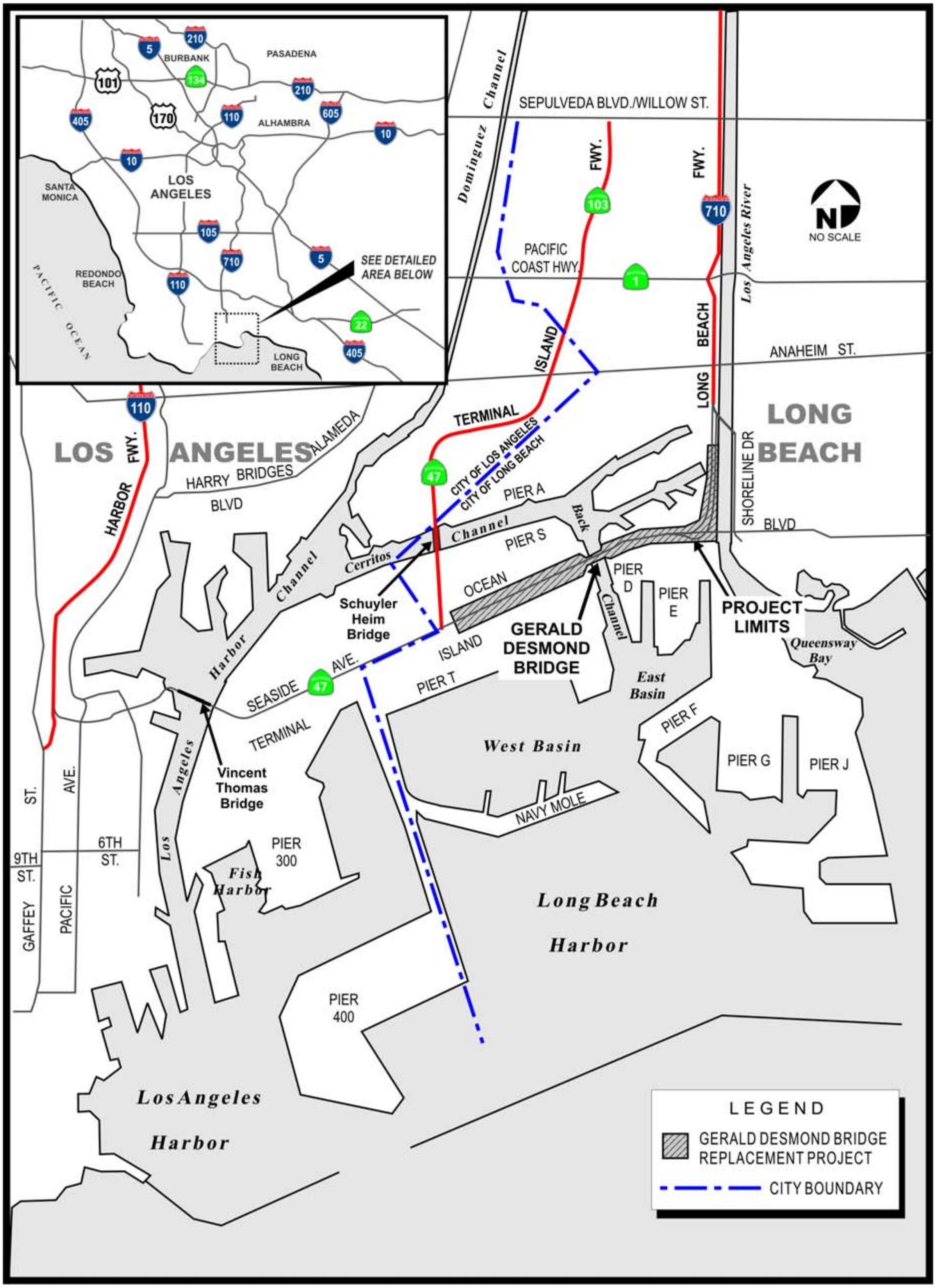


Figure 1
Gerald Desmond Bridge Replacement Project Vicinity and Project Location Map

At the Route 710 interchange, a configuration similar to the existing configuration, where the connectors link Route 710 with the outside lanes of the Gerald Desmond Bridge, would be provided. Ramps (a two-lane off-ramp in the eastbound direction and a single-lane on-ramp in the westbound direction) would be used to join the median of the new Gerald Desmond Bridge with Ocean Boulevard to and from downtown Long Beach. A new loop ramp would be used to replace the existing ramp between the westbound Gerald Desmond Bridge and Pico Avenue. The existing ramps between the eastbound Gerald Desmond Bridge and Pico Avenue would be partially reconstructed to join the new connectors from Route 710. This interchange concept enables trucks traveling to and from Route 710 to remain in the outside lanes, while cars traveling to and from downtown Long Beach via Ocean Boulevard remain in the inside lanes. This approach minimizes the intermixing of cars and trucks accessing the above facilities.

The Pier T Avenue (Terminal Island East) interchange would use "horseshoe"- shaped ramps to provide access from westbound Gerald Desmond Bridge to Pier T Avenue and from Pier T Avenue to eastbound Gerald Desmond Bridge. Additional ramp connections would be provided between Pier T Avenue and both, Ocean Boulevard and the one-way frontage roads created by the Ocean Boulevard/Terminal Island Freeway interchange project. These ramps would allow full access between Pier T Avenue and Ocean Boulevard in all directions.

4. PROJECT IMPACT ANALYSIS

4.1 Project Compliance with CFR 93.116 and 93.123

Section 93.116 (a) of 40 CFR states that an FHWA/Federal Transit Authority (FTA) project must not cause or contribute to any new localized $PM_{2.5}$ violations or increase the frequency or severity of any existing PM_{10} or $PM_{2.5}$ violations in nonattainment or maintenance areas. The regulations further state that projects may satisfy this requirement without an analysis of their potential to create particulate matter hot spots, provided that they do not meet the criteria set forth in Section 93.123 (b) for "projects of air quality concern (POAQC)."

A project may be considered to have one of three types of status: (1) Exempt; (2) Not be exempt but not be a POAQC based on the specific parameters established in the regulations; and (3) It may be a POAQC, which requires that a qualitative hot-spot analysis be conducted. *The Gerald Desmond Bridge Replacement project does not meet the definition of an exempt project under Section 93.126 or 93.128.*

The 2006 Final Transportation Conformity Rule defines a POAQC that requires PM_{10} and $PM_{2.5}$ hot-spot analysis in 40 CFR 93.123(b)(1) as:

(i) New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;

(ii) Projects affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;

(iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;

(iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and

(v) Projects in or affecting locations, areas, or categories of sites that are identified in the $PM_{2.5}$ and PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The proposed project falls within the category of new or expanded highway projects with a significant number of diesel vehicles, and would be affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles. The project would be considered as a POAQC based on the criteria listed in the final conformity rule (40 CFR 93.123 (b)(1)). Therefore, a qualitative project-level hot-spot analysis was conducted to assess whether the project would cause or contribute to any new localized PM_{10} or $PM_{2.5}$ violations, or increase the frequency or severity of any existing violations, or delay timely attainment of the PM_{10} or $PM_{2.5}$ NAAQS.

4.2 Analysis Methodology and Types of Emissions Considered

The proposed project is located in the South Coast Air Basin (SCAB), which is designated as nonattainment for the federal PM_{10} and $PM_{2.5}$ standards. In order to implement the hot-spot analysis requirements of the March 10, 2006 final rule, the *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (Guidance) *[EPA420-B-06-902, March 2006]* was used to perform this Qualitative Hot Spot Analysis.

The analysis was based on directly emitted $PM_{2.5}$ and PM_{10} emissions, including tailpipe, break wear, and tire wear. Secondary particles formed through PM precursors take several hours to form in the atmosphere; thus, they would be dispersed beyond the immediate project vicinity; therefore, they are not considered in a hot-spot analysis. Secondary emissions are included in the regional emission analysis prepared for the conforming RTP and TIP. Vehicles cause dust from paved and unpaved roads to be re-entrained or resuspended in the atmosphere. According to the 2006 Final Rule, road dust emissions are to be considered for PM_{10} hot-spot analysis. For $PM_{2.5}$, road dust emissions are only to be considered in hot-spot analysis if EPA or the state air agency has made a finding that such emissions are a significant contributor to the $PM_{2.5}$ air quality problem (40 CFR 93.102(b)(3)). EPA or CARB have not made such finding of significance; therefore, these emissions are not included in this analysis.

Additionally, the proposed project construction would last less than 5 years; therefore, temporary construction emissions are not considered in this analysis.

Trend Analysis. For performing the trend analysis, PM_{10} and $PM_{2.5}$ ambient air quality data from monitoring stations within the proposed project area were utilized. This data was compared with PM_{10} and $PM_{2.5}$ NAAQS and also examined for trends to predict future conditions in the project vicinity. In the following sections, the project impacts, as well as the likelihood of these impacts interfering with the ambient $PM_{2.5}$ and PM_{10} levels to cause hot spots, are discussed. The opening year (2015), as well as the horizon year of 2030, were considered for the analysis.

Data Consideration

Particulate Levels in the Project Area

SCAQMD maintains a network of air quality monitoring stations located throughout the SCAB and has divided the Basin into 27 source/receptor areas (SRAs). The project is located in SRA number 4, South Coastal Los Angeles County. The nearest SCAQMD air monitoring station to the project site is the North Long Beach Monitoring Station (Station No. 072), which is located at 3648 Long Beach Boulevard, approximately 4 miles northeast of the project site.

Both the Port and the Port of Los Angeles (POLA), have recently initiated air monitoring studies to collect representative ambient pollutants and meteorological data within the Ports' operational region of influence (ROI). The special study programs include monitoring concentrations of PM_{10} and $PM_{2.5}$ to determine ambient levels of these pollutants within the Ports area.

The Port's air monitoring stations are strategically located in two areas at the Port: one in the Inner Harbor area, near West Long Beach, and a second in the Outer Harbor area, near the breakwater. These monitoring stations were developed to expand upon and compliment other regional air monitoring efforts conducted by the California Air Resources Board, the South Coast Air Quality Management District and the Port of Los Angeles. The Port monitored data are available from September 2006 (*Port, 2007*). Since air quality is a local as well as a regional issue, data from the Port's stations are considered in context with the North Long Beach monitoring station for comparison purposes, and to ensure the use of representative ambient data. The 2006 Port monitored data for $PM_{2.5}$ is very similar to the data from North Long Beach Station, however, the PM_{10} data from the Port stations are higher than data recorded at the North Long Beach Station. Comparison of monitored data at the POLA monitoring stations show agreement with the SCAQMD monitoring stations data, for both PM_{10} and $PM_{2.5}$ (*POLA, 2007*). Appendix A presents data from Ports' monitoring stations.

For purpose of trend analysis, the recorded data at the North Long Beach Stations were used in this report, since the station include the most comprehensive monitoring in the local area. The recorded recent data available from this station include data for the years 1999 to 2006. Table 1 and Figure 2 show the particulate concentrations and their historical trend (both PM_{10} and $PM_{2.5}$), as recorded at this Monitoring Station. Table 1 provides the measured concentrations and the number of days that the applicable NAAQS was exceeded. Figure 2 includes normalized concentrations and shows the trend of the pollutant changes in the area. Normalized concentrations represent the ratio of the highest measured concentrations in a given year to the applicable national standard. Therefore, normalized concentrations lower than one indicate that the measured concentrations were lower than the ambient air quality standard. The monitored data show the following trends:

- **Respirable Particulate Matter (PM_{10}) –** During the recorded period of 1999 to 2006, both the 24-hour maximum and the annual average monitored data were well below the NAAQS. The highest recorded 24-hour concentration during the period of 1999 to 2006 was 91 $\mu g/m^3$, recorded in 2001. The highest annual average was 39 $\mu g/m^3$ for 1999. The NAAQS were not exceeded at any time during the last 8 years at the monitoring station.

- **Fine Particulate Matter ($PM_{2.5}$) –** During the recorded period of 1999 to 2005, the 24-hour 98th percentile concentration, which was averaged over 3 years, ranged from 57 to 45 $\mu g/m^3$. These recorded levels, are below the previous NAAQS (between 88 percent and 70 percent of the 65 $\mu g/m^3$ standard level), with a higher declining rate since 2002. Although based on the new standard, the 24-hour NAAQS of 35 $\mu g/m^3$, was exceeded during the reported period, the declining rate is not changed. The annual mean $PM_{2.5}$ concentration exceeded the NAAQS every year except 2006; however, the data show a declining trend. Specifically, from 2001 to 2003 the annual average concentrations show an approximate 8.5 percent reduction rate, which is very little change from 2003 and 2004, and a higher reduction rate of approximately 12 percent from 2004 to 2005 (17.9 µg/m^3 to 15.9 µg/m^3) concentrations. The data indicates a general declining trend for the ambient $PM_{2.5}$ concentrations in the project area.

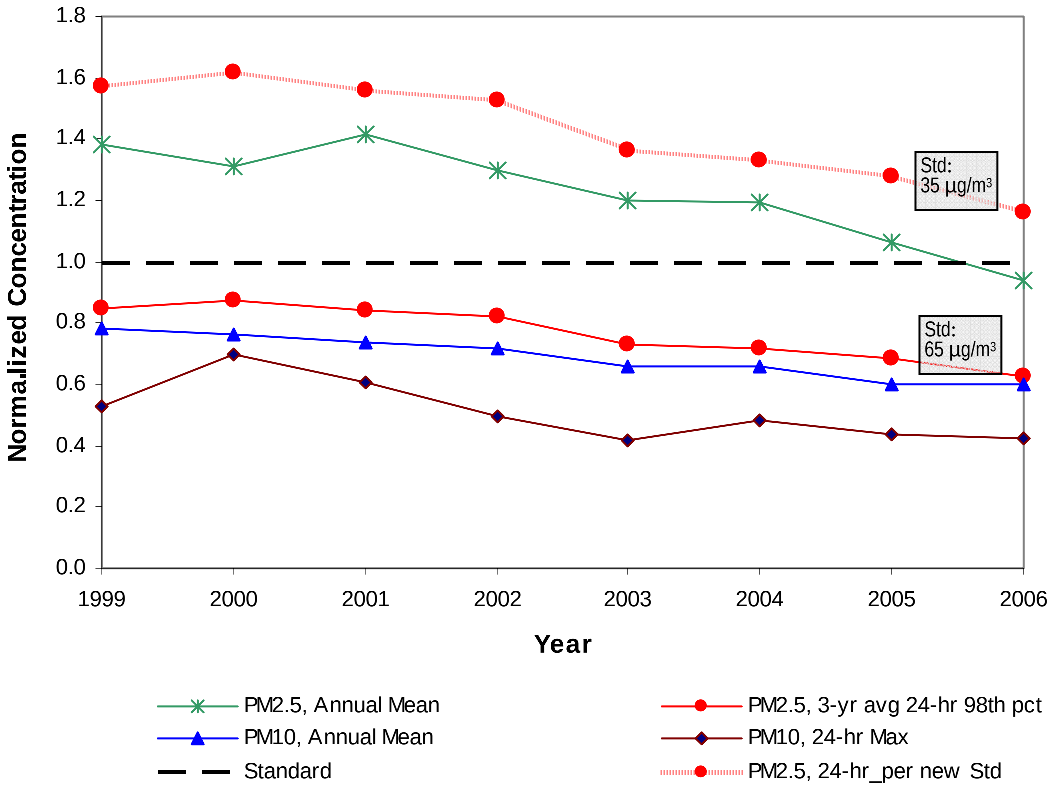
Table 1. Particulate Matter Data Summary (North Long Beach Monitoring Station)

Pollutant	Standard (µg/m^3)	Recorded Concentrations (µg/m^3)							
		1999	2000	2001	2002	2003	2004	2005	2006
Respirable Particulate Matter (**PM_{10}**)	(24-Hour)								
	1st Maximum Concentration (µg/m^3)	79	105	91	74	63	72	66	51
	Days > NAAQS (150 µg/m^3)	0	0	0	0	0	0	0	0
	(Annual Average)								
	Annual Arithmetic Mean (50 µg/m^3)	39	38	37	36	33	33	30	30
Fine Particulate Matter (**$PM_{2.5}$**)	(24-Hour)								
	1st Maximum Concentration (µg/m^3)	67	82	73	63	115	67	54	59
	98th Percentile of 24-hr Concentration (µg/m^3)	51	64	49	47	47	46	41	50
	Days > NAAQS (65 µg/m^3)	0	0	0	0	0	0	0	0
	3-year Average 98th Percentile (µg/m^3)[a]	55	57	55	53	48	47	45	41
	(Annual)								
	Annual Arithmetic Mean (15 µg/m^3)	**20.7**	**19.7**	**21.2**	**19.5**	**18.0**	**17.9**	**15.9**	**14.1**

[a] *Attainment condition for $PM_{2.5}$ is that the 3-year average of the 98th percentile of 24-hour concentrations at each monitor within an area must not exceed the standard, which was 65 µg/m^3 during the reported period. The new 2-hour standard of 35 µg/m^3 became effective in December of 2006. Annual exceedances are shown in bold type.*

Source: CARB, 2006.

Figure 2. Normalized Monitored PM Concentrations – 1999 to 2006
North Long Beach Monitoring Station



Future Trends

The area surrounding the project is mostly built out and consists primarily of industrial and Port-related uses. The climate and meteorology at the project site are typical of coastal areas, with variable winds during the day that facilitate the dispersion of pollutants better than in the inland areas. Therefore, the future air quality is expected to improve as per the trend shown in Table 1 and Figure 2 and also in the SIP.

The proposed project is included in the RTP; thus, it is included in the SCAB air quality modeling efforts for the region, as provided in the 2003 AQMP.

Basin Trends

SCAQMD's 2003 AQMP includes modeled estimates of future air quality levels within the SCAB. The modeling results that are reported in the 2003 AQMP indicate that particulate matter emissions and other criteria pollutants have decreased significantly with implementation of new air quality standards and more stringent rules and regulations. Additionally, comparisons with recent year projections show that the air quality is improving at a greater rate than what was projected by the models.

Table 2, which was derived from Chapter 10 (Looking Beyond Current Requirements) of the 2003 AQMP, provides a comparison of the monitored 2001 PM levels to the model predicted values for 2006 and 2010. As shown, the projected data indicates a trend of decreasing ambient PM concentrations from 2001 to 2010.

Table 2. Comparison of Particulate Matter Ambient Concentrations

Pollutant (Averaging Time)	Standard ($\mu g/m^3$)	2001		2006		2010	
		Observed Max Value ($\mu g/m^3$)	% Above Standard	Observed Max Value ($\mu g/m^3$)	% Above Standard	Observed Max Value ($\mu g/m^3$)	% Above Standard
PM_{10} (24-hour)	150	219	46	150	-	133	-
PM_{10} (Annual)	50	63	26	49	-	45	-
$PM_{2.5}$ (24-hour)	65	98	51	97	49	68	5
$PM_{2.5}$ (Annual)	15.0	31	107	29	95	27	80

[1] 2010 projected data include the 2003 Control Strategies.
Source: South Coast Air Quality Management District, 2003 AQMP, Chapter 10.

The monitored PM ambient concentrations at the Long Beach Station, shown in Table 1, support the model predicted trends, as the recorded PM_{10} and $PM_{2.5}$ levels at the monitoring station between the years 1999 and 2005 for both the 24-hour levels and average annual values show a general declining trend.

Project Traffic Impacts

The proposed project would replace the existing physically and functionally deficient Gerald Desmond Bridge with a new structure that would be able to carry the projected traffic volume increase in the area. In addition, the project includes the reconfiguration of freeway interchanges within the project limit and some arterial street intersections. Therefore, the project would improve traffic operations along segments of Ocean Boulevard, the Gerald Desmond Bridge, and freeway ramps and interchanges, as well as intersections within the project corridor.

Roadway Segments

The existing bridge has two travel lanes in each direction, with a truck climbing lane of six percent approach grade at the ascending direction up to the crest of the bridge where they merge back to the two-lane configuration. The need for the truck climbing lanes, coupled with the traffic congestion during the morning and afternoon peak operation hours, have led to a higher than statewide average accident rate on this facility. The Gerald Desmond Bridge Replacement Project would accommodate current car and truck traffic volumes and meet future needs and reduce the approach grades. In addition, the project would include roadway and circulation improvements, which would reduce non-recurring congestion in the project area. Non-recurring congestion is traffic congestion related to automobile crashes, disabled vehicles, work zones, adverse weather events, and planned special events (FHWA, 2006). The addition of a 9.8 ft (3 m) outside shoulder and an 11.8 ft (3.6 m) inside shoulder at the approaches of the new bridge would provide room for emergency response vehicles, roadway maintenance personnel and disabled automobiles without causing major congestion/roadway closures to occur. These improvements in access would reduce delays in traffic thereby providing the benefit of improved air quality in the project area. Furthermore, the proposed improved 5% approach grade would help reduce emissions of pollutants from faster moving trucks in comparison to the emissions from the slower truck traffic and higher RPM trucks to climb uphill on the existing steep grade of the truck climbing lane.

Tables 3 and 4 present a comparison of average daily traffic conditions for the No Build and Build Alternatives in opening year 2015 and horizon year 2030, respectively. The comparison indicates that the average daily traffic is approximately the same with implementation of the project. The slight volume decrease shown in the westbound direction of Ocean Boulevard is due to a change in configuration of the westbound horseshoe on-ramp.

Table 5 provides the peak hour VMT within the project area for the No Build and Build Alternatives. As shown, the VMTs are slightly lower for the Build Alternative compared to the No Build Alternative, and the average vehicle travel speed would slightly increase in the project area. Both of these effects would translate into a decrease in vehicle emissions.

Table 3. Comparison of Roadway Segments Traffic Conditions for the No Build and Build Alternatives (Opening Year 2015)

Roadway Segment	AADT (All Vehicles)			Truck AADT and Percentage				
				No Build		Build		
	No Build	Build	% AADT Change	AADT	% Trucks	AADT	% Trucks	% AADT Change
Ocean Boulevard								
Navy Way to Pier S Avenue								
Eastbound	41,915	41,915	0	12,811	30.6	12,812	30.6	0.01
Westbound	37,910	37,853	-0.15	11,479	30.3	11,471	30.3	-0.07
Pier S Avenue to Terminal Island Fwy								
Eastbound	35,648	35,648	0	8,955	25.1	8,956	25.1	0.01
Westbound	30,749	29,320	-4.65	5,654	18.4	5,465	18.6	-3.46
Terminal Island Fwy to Horseshoe Ramps								
Eastbound	37,786	37,787	0	10,132	26.8	10,133	26.8	0.01
Westbound	33,694	31,996	-5.04	7,378	21.9	7,170	22.4	-2.90
I-710 Connector Ramps to Downtown								
Eastbound (from Northbound Ramp to Downtown)	6,823	6,823	0	0	0	0	0	0
Westbound (from Downtown to Southbound Ramp)	10,450	10,449	-0.01	0	0	0	0	0
Gerald Desmond Bridge								
Eastbound	40,868	40,868	0	12,235	29.9	12,236	29.9	0.01
Westbound	36,193	35,865	-0.91	10,545	29.1	10,517	29.3	-0.27
Northbound I-710 Connector Ramp	26,004	26,003	0	4,587	17.6	4,587	17.6	0
Southbound I-710 Connector Ramp	19,007	19,007	0	4,999	26.3	4,999	26.3	0
I-710 between Pacific Coast Highway and Willow Street Northbound	26,004	26,003	0	4,587	17.6	4,587	17.6	0
Southbound	19,007	19,007	0	4,999	26.3	4,999	26.3	0

AADT – average annual daily traffic

Source: MMA, 2006.

Table 4. Comparison of Roadway Segments Traffic Conditions for the No Build and Build Alternatives (Horizon Year 2030)

Roadway Segment	AADT (All Vehicles) No Build	AADT (All Vehicles) Build	AADT (All Vehicles) % AADT Change	Truck No Build AADT	Truck No Build % Trucks	Truck Build AADT	Truck Build % Trucks	Truck % AADT Change
Ocean Boulevard								
Navy Way to Pier S Avenue								
Eastbound	59,541	59,558	0.03	22,019	37	22,029	37	0.05
Westbound	57,720	57,640	-0.14	22,653	39.2	22,621	39.2	-0.14
Both Directions	117,261	117,198	-0.05	44,672	38.1	44,650	38.1	-0.05
Pier S Avenue to Terminal Island Fwy								
Eastbound	48,314	48,331	0.04	15,543	32.2	15,553	32.2	0.06
Westbound	49,231	47,066	-4.40	16,733	34	16,478	35	-1.55
Both Directions	97,545	95,397	-2.20	32,276	33.1	32,031	33.6	-0.76
Terminal Island Fwy to Horseshoe Ramps								
Eastbound	54,346	54,364	0.03	19,835	36.5	19,846	36.5	0.06
Westbound	56,027	53,414	-4.66	21,295	38	20,998	39.3	-1.41
Both Directions	110,373	107,778	-2.35	41,130	37.3	40,844	37.9	-0.70
I-710 Connector Ramps to Downtown								
Eastbound (from Northbound Ramp to Downtown)	7,056	7,056	0	0	0	0	0	0
Westbound (from Downtown to Southbound Ramp)	11,896	11,896	0	0	0	0	0	0
Gerald Desmond Bridge								
Eastbound	62,162	62,180	0.03	26,276	42.3	26,287	42.3	0.04
Westbound	62,500	61,972	-0.84	28,080	44.9	28,005	45.2	-0.27
Both Directions	124,662	124,152	-0.41	54,356	43.6	54,292	43.7	-0.12
Northbound I-710 Connector Ramp	59,541	59,558	0.03	22,019	37	22,029	37	0.05
Southbound I-710 Connector Ramp	57,720	57,640	-0.14	22,653	39.2	22,621	39.2	-0.14
I-710 between Pacific Coast Highway and Willow Street								
Northbound	48,314	48,331	0.04	15,543	32.2	15,553	32.2	0.06
Southbound	49,231	47,066	-4.40	16,733	34	16,478	35	-1.55
Both Directions	97,545	95,397	-2.20	32,276	33.1	32,031	33.6	-0.76

Source: MMA, 2006.

Table 5. Vehicle Miles Traveled and Average Vehicle Speed in Project Area

Vehicle Type	2015 PM Peak Hour VMT No-Build	2015 VMT Build	2015 Average Speed (mph) No-Build	2015 Average Speed (mph) Build	2030 PM Peak Hour VMT No-Build	2030 VMT Build	2030 Average Speed (mph) No-Build	2030 Average Speed (mph) Build
Port Autos	61,959	61,719	27	28	83,393	83,172	20	20
Port Trucks	35,874	35,766	30	31	50,223	49,951	21	21
Non-Port vehicles (Autos & Trucks) using project facilities	395,623	394,595	31	31	425,605	425,081	27	27
Total Vehicles	493,456	492,080	31	31	559,222	558,204	25	26

Source: MMA, 2006

Intersections

As a result of the proposed project, delays due to traffic congestion at the project intersections would be greatly reduced, and the average vehicle travel speed would slightly increase. Both of these effects would translate into a decrease in vehicle emissions. In 2030, the LOS at the intersections within the project area would be improved by implementing the Build Alternative. Tables 15 and 16 compare the PM peak-hour intersection conditions of the No Build Alternative to the Build Alternative for 2015 and 2030, respectively. Among the 11 intersections that were analyzed, the LOS of the Build Alternative would improve at 9 intersections compared to the No Build Alternative. The intersection of Pico Avenue and Broadway would have a worse LOS compared to the No Build Alternative (B versus A); however, the intersection would operate at LOS B with no potential congestion or hot-spot condition. The intersection of Pico Avenue and Pier E Street would operate at LOS F under both the No Build and Build Alternatives, but will improve to LOS (TBD) for the Build Alternative.

An emissions increase of PM would occur when the project results in a significant increase in ADT and VMT in the project area and/or an increase in traffic congestion and delays. The delay would be mostly at intersections where vehicles are accumulating and idling, and they would have worse LOS than with the No Build Alternative. It is unlikely that PM hot spots would be associated with the proposed action because local accumulation and delay of vehicles would be reduced by the project. The proposed project would not increase diesel truck percentages in the project area, and there would be a slight reduction of VMT when implementing the proposed project. Thus, the project is not expected to cause any concern with respect to localized concentrations of $PM_{2.5}$ or PM_{10}.

In conclusion, the proposed project would improve the operations of the intersections and increase the vehicle speed in the project area. Accordingly, it is unlikely that PM emissions associated with the proposed action would cause significant adverse impacts to the existing air quality.

Table 6. Comparison of Intersection Traffic Conditions for the No Build and Build Alternatives (Opening Year 2015)

Intersection	Opening Year - 2015					
	No Build Alternative			Build Alternative		
	LOS	Delay/ Vehicle	V/C	LOS	Delay/ Vehicle	V/C
Terminal Island Freeway/Ocean Boulevard	E	-	0.946	D	-	0.879
Pier S Avenue/Ocean Boulevard	C	-	0.723	B	-	0.664
Terminal Island Freeway/Southbound Off-Ramp New Dock Street	B	10.9	0.001	B	10.7	0.001
Terminal Island Freeway/Northbound On-Ramp New Dock Street	B	11.5	0.412	B	10.7	0.335
Pier S Avenue/New Dock Street	A	-	0.367	A	-	0.369
Navy Way/Seaside Avenue	E	-	0.955	E	-	0.979
Pico Avenue/Pier B Street/9th Avenue	A	-	0.587	A	-	0.600
Pico Avenue/Pier C Street	A	-	0.324	A	-	0.326
Pico Avenue/Pier D Street	C	17.2	0.768	C	16.4	0.746
Pico Avenue/Broadway	A	9.4	0.001	B	10.4	0.001
Pico Avenue/Pier E Street	D	27.6	0.899	E	32.6	0.973

Source: MMA, 2006.

Table 7. Comparison of Intersection Traffic Conditions for the No Build and Build Alternatives (Horizon Year 2030)

Intersection	Opening Year – 2015					
	No Build			Build		
	LOS	Delay/ Vehicle	V/C	LOS	Delay/ Vehicle	V/C
Terminal Island Freeway/Ocean Boulevard	F	-	1.313	F	-	1.294
Pier S Avenue/Ocean Boulevard	F	-	1.213	F	-	1.102
Terminal Island Freeway/Southbound Off-Ramp New Dock Street	C	17.7	0.001	C	16.8	0.001
Terminal Island Freeway/Northbound On-Ramp New Dock Street	E	47.8	1.013	D	28.5	0.880
Pier S Avenue/New Dock Street	C	-	0.743	B	-	0.643
Navy Way/Seaside Avenue	F	-	1.122	F	-	1.151
Pico Avenue/Pier B Street/9th Avenue	C	-	0.712	B	-	0.645
Pico Avenue/Pier C Street	A	-	0.432	A	-	0.431
Pico Avenue/Pier D Street	E	49.5	1.158	E	44.1	1.117
Pico Avenue/Broadway	B	10.6	0.001	B	12.2	0.001
Pico Avenue/Pier E Street	F	89.2	1.286	D	-	0.885

Source: MMA, 2006.

Direct Operational Emissions from Vehicles Traffic

The primary source of air pollutants emissions generated by the proposed project would be from motor vehicles traveling within the project corridor. To determine the project direct operational impact, the emission analysis was performed for the project study area between Interstates 710, 110, 405, and the Port (Ocean Boulevard). Particulate matter (PM_{10} and $PM_{2.5}$) emissions from vehicles traveling in the project study area were estimated and compared with the No Build alternative for the years 2015 and 2030. Peak hour VMT data of the No Build and Build Alternatives were provided by the project Traffic Study Report (Meyer, Mohaddes Associates, 2006). Emission factors were obtained using EMFAC2002 model (CARB, 2002). Emissions were calculated based on three major categories of vehicles: 1) for *port autos* (port-related trips, such as Port employees commute), the passenger car emission factor (LDA); 2) for *port trucks* the EMFAC2002 emission factors of heavy heavy duty diesel trucks (HDT); and 3) for other non-Port vehicles traffic the composite emission factors (ALL) for Los Angeles County vehicle mix. The emission factors selected from the EMFAC2002 results were based on the projected average speed for each of the considered vehicle categories, per traffic study. The results are summarized in Table 8. As shown, emissions of PM_{10} and $PM_{2.5}$ are estimated to be lower than those from the No-Build Alternative. This is due to the lower VMTs and higher speed of vehicle traffic for the project Build alternative compared to the No Build alternative.

Although Table 8 indicates an increase of emissions from year 2015 to 2030, the emissions would likely be lower than the presented levels as a result of EPA's national control programs that are projected to reduce mobile source emissions. These control measures include retrofit measures that help reduce the future emissions, decreasing trend in background concentrations. These measures will help offset any increase in VMT-related emissions in the future years. Furthermore, the CARB has adopted a Diesel Risk Reduction Plan (DRRP) with control measures that would reduce the overall diesel PM emissions by about 85% from 2000 to 2020. These reduction measures are not reflected in the EMFAC2002 emission factors used in the analysis above. Therefore, future DPM emissions would be expected to decline even more than indicated above. In order to examine this argument, the results were obtained using newly release EMFAC2007, and are presented in Table 8b. The estimated project emissions, as summarized in Table 8b, indicate a reduction due to implementation of the proposed project, as well as the declining trend of emissions from year 2015 to year 2030.

Furthermore, the proposed project would not induce development in the area, but would accommodate the projected growth and development by improving the mobility of operation of roadway network in the Port area.

Table 8a. Summary of Operation Phase Motor Vehicle Emissions (lbs/day) – using EMFAC2002

Year	Alternative	PM_{10} Total	$PM_{2.5}$ Total
Opening Year 2015	No Build	486	321
	Build	454	313
	Net Difference	-32	-8
Horizon Year 2030	No Build	561	354
	Build	556	350
	Net Difference	-5	-4

1. *Emissions are calculated using emission factors from EMFAC2002, at the projected average speed of each category of vehicles within the study area (from Traffic Study Report).*
2. *VMT and average speed data are summarized in Table 5 of this Report.*

Table 8b. Summary of Operation Phase Motor Vehicle Emissions (lbs/day) – using EMFAC2007

Year	Alternative	PM_{10} Total	$PM_{2.5}$ Total
Opening Year 2015	No Build	622	417
	Build	617	413
	Net Difference	-5	-4
Horizon Year 2030	No Build	593	399
	Build	588	395
	Net Difference	-5	-4

3. *Emissions are calculated using emission factors from EMFAC2002, at the projected average speed of each category of vehicles within the study area (from Traffic Study Report).*
4. *VMT and average speed data are summarized in Table 5 of this Report.*

Indirect Operational Emissions Impacts

The existing bridge is located over the main federal navigation channel (Back Channel) that serves the Port. It provides a vertical clearance of 156 ft (47.5 m) above mean high water level (MHWL), which has proven to be insufficient for the clearance of some existing container ships, as well as new vessels currently being constructed. The Gerald Desmond Bridge is one of the lowest bridges in any large commercial port in the world. The proposed bridge would provide a higher vertical clearance of 200 ft (61 m), which would allow the passage of larger, taller vessels; as such, the project would have potential indirect impacts on air quality by affecting the marine traffic. However, as the Port's Transportation Growth Inducement Analysis concluded, the bridge height would not cause substantial change in marine traffic of larger vessels for the following reasons.

- Given the current plans for Piers A and S, both facilities are constrained by the size of their container storage yard. That is, the berths can accommodate more cargo than the container storage yards can handle. Furthermore, Pier S would be one of the smallest container terminals in San Pedro Bay; thus, it is expected that ships in the largest category would not call at Pier S. Pier A is a better candidate for hosting the largest forecasted marine vessels.
- The Gerald Desmond Bridge height is not the only navigational constraint for Piers A and S. Most significant is the Back Channel depth under the bridge. Navigational safety concerns would require the Port to widen the channel to 315 ft (96 m) at a maximum water depth of 52 ft (16 m) at mean lower low water. However, even with these improvements, the largest ship would not be able to navigate the channel safely. Vessels would require a wider channel and deeper water, which are not considered feasible or cost effective for the foreseeable future.

Based on these results, it can be concluded that the potential growth inducement associated with the proposed project would not be significant, and it is not expected to result in considerable emissions of air pollutants. As such, the impact of indirect emissions would be less than significant and thus, was not considered for further analysis in this report.

PM_{10} and $PM_{2.5}$ Regional Impact

Regional impacts from criteria pollutants, including PM_{10} and $PM_{2.5}$, associated with transportation projects that are listed in the RTIP, are included in the regional emissions analysis conducted for the AQMP and SIP, both of which meet the regional conformity requirements. In addition, it is unlikely that the project would cause a regional air quality impact for PM because the analysis conducted for the SIP for ozone attainment would be similar to the analysis required for secondary $PM_{2.5}$ formation, and progress toward attainment of the standard would be achieved.

The proposed project is referenced in Appendix I of the federally approved 2004 RTP, within the "2004 RTP – Los Angeles County, Local Highways" list, under the following three projects:

- LA000512 Gerald Desmond Bridge Replacement

The Gerald Desmond Bridge Replacement Project is also listed in the Final 2006 RTIP – Los Angeles County Local Highways Projects list, under the conformity category "non-exempt" in two parts (see Appendix B for a copy of the RTIP page, including project), as follows:

- LA000512 Model No.: 1248; – Gerald Desmond Bridge Replacement (SAFETEA-LU PNRS #14 – SEC 1301B); and
- LA0F011 Model No.: L424; – Ocean Boulevard over Entrance Channel, UPRR, 1.0 mile east of State Route 47. Replace existing 5-lane Gerald Desmond Bridge with new 6-lane bridge (BRIDGE #53C0013)

The Gerald Desmond Bridge project is consistent with the 2004 RTP adopted by SCAG and is included in the final 2006 RTIP (adopted October 2, 2006). Both of these have been found to conform with the SIP. The regional air quality impacts would be less than significant.

5. CONCLUSION

The project purpose is to replace the existing physically and functionally deficient Gerald Desmond Bridge with a structurally sound and seismically resistant structure that would meet vehicular and shipping needs for its planned 100-year design life. The proposed project improvements would also improve local traffic conditions and access to the Port area.

Historical meteorological and climatic data indicate that the regional and local meteorological and climatic conditions have been relatively consistent within the last 30 years and likely consistency is anticipated until the horizon year of 2030. In addition, no significant changes to the current general terrain and geographic characteristics of the project in relation to the coastal SCAB areas are anticipated.

The air quality data, recorded at the closest local monitoring station, shows a declining trend of background particulate (PM_{10} and $PM_{2.5}$) concentrations within the project area. The monitoring data indicate that the NAAQS for the 24-hour PM_{10} standard has not been exceeded during the last seven years, and the annual PM_{10} concentration was not exceeded during the last seven years. For $PM_{2.5}$, the 24-hour recorded concentrations were below the previous NAAQS of 65 $\mu g/m^3$, and exceed the new standard of 35 $\mu g/m^3$. Similarly, the annual $PM_{2.5}$ concentration levels exceeded the NAAQS during the reported period. However, the monitored data show an overall trend of declining background concentrations for both $PM_{2.5}$ and PM_{10} within project area (see Table 1 and Figure 2). Based on the current trend, the 24-hour and the annual average PM_{10} and $PM_{2.5}$ ambient concentrations would likely decrease further by years 2015 and 2030.

The proposed project would not induce development in the area, but would accommodate the projected growth and development by improving the mobility of operation of roadway network in the Port area. Total vehicle traffic and truck traffic volumes and VMT, for proposed Build alternative are projected to be similar to or slightly less than the no-build alternative by 2015 and 2030. An emissions increase of PM would occur when the project results in a significant increase in ADT and VMT in the project area and/or an increase in traffic congestion and delays. Based on the presented discussion, implementation of the proposed project would improve LOS, decrease delay at the project area intersections, and would increase the average vehicle speed, all of which are indication of reduced congestion and idling of vehicles. The proposed project would not increase diesel truck percentages in the project area, substantially, and there would be a slight reduction of VMT and increase in average vehicle speed, when implementing the proposed project. Thus the project is not expected to cause any concern with respect to localized concentrations of PM_{10} or $PM_{2.5}$.

The above discussions demonstrate that future new or worsened PM_{10} or $PM_{2.5}$ NAAQS violations are not anticipated, and therefore, the proposed project meets the conformity requirements in 40 CFR 93.123(b)(1)(i) to support state and local air quality goals with respect to potential localized air quality impacts.

6. REFERENCES

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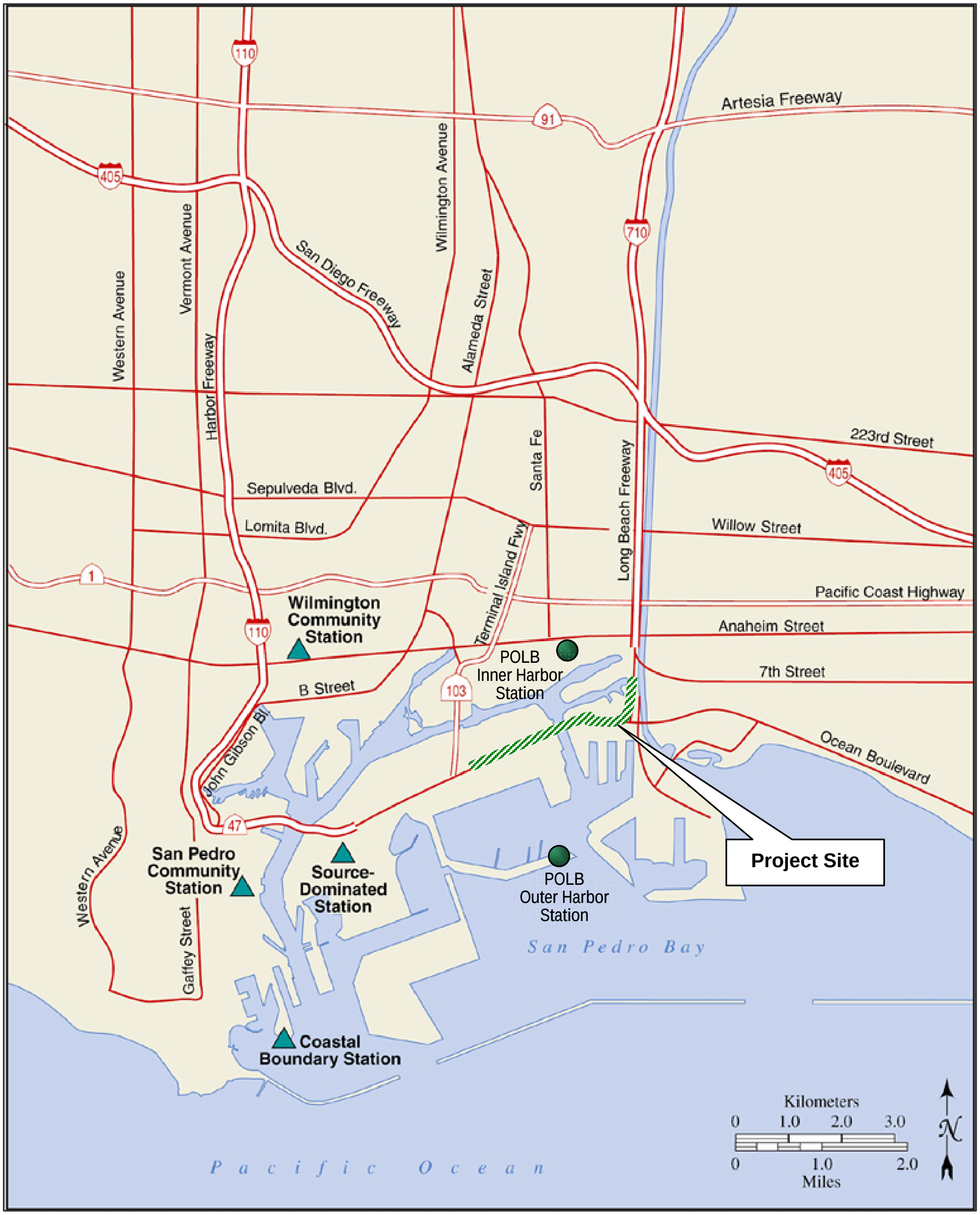
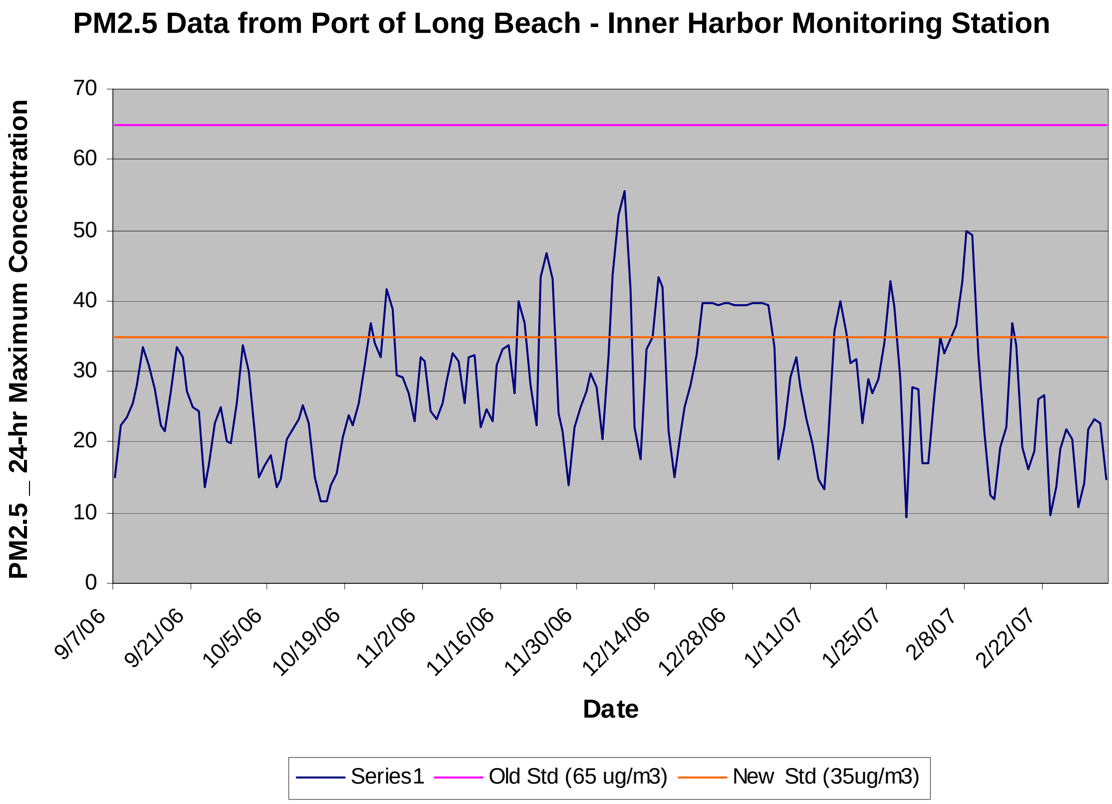
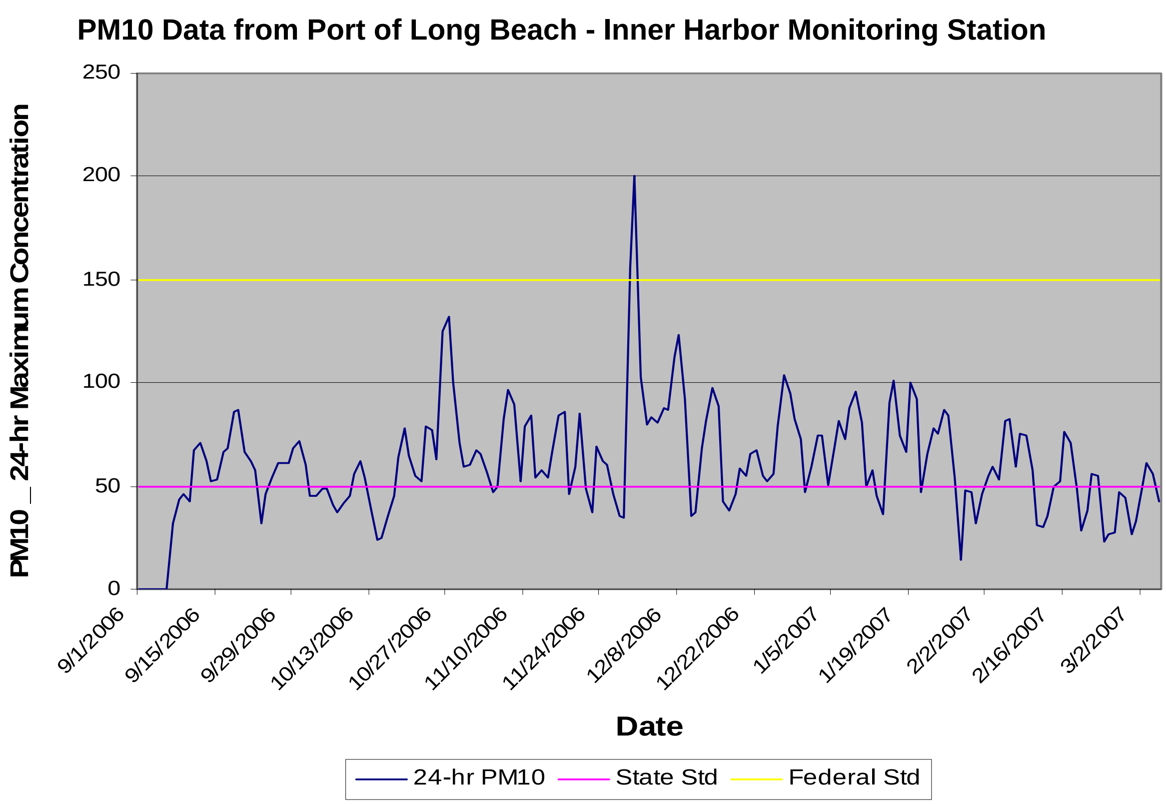
Appendix A

Air Quality Monitored Data at
Port of Long Beach and Port of los Angeles
Monitoring Stations

Port of Los Angeles and Port of Long Beach
Air Quality Monitoring Stations




PM2.5 Data from Port of Long Beach - Inner Harbor Monitoring Station
PM2.5 _ 24-hr Maximum Concentration
70
60
50
40
30
20
10
0
9/7/06
9/21/06
10/5/06
10/19/06
11/2/06
11/16/06
11/30/06
12/14/06
12/28/06
1/11/07
1/25/07
2/8/07
2/22/07
Date
Series1
Old Std (65 ug/m3)
New Std (35ug/m3)


PM10 Data from Port of Long Beach - Inner Harbor Monitoring Station
PM10 _ 24-hr Maximum Concentration
250
200
150
100
50
0
9/1/2006
9/15/2006
9/29/2006
10/13/2006
10/27/2006
11/10/2006
11/24/2006
12/8/2006
12/22/2006
1/5/2007
1/19/2007
2/2/2007
2/16/2007
3/2/2007
Date
24-hr PM10
State Std
Federal Std

Comparison of Port Monitored Data and North Long Beach Station Data - (Year 2006)

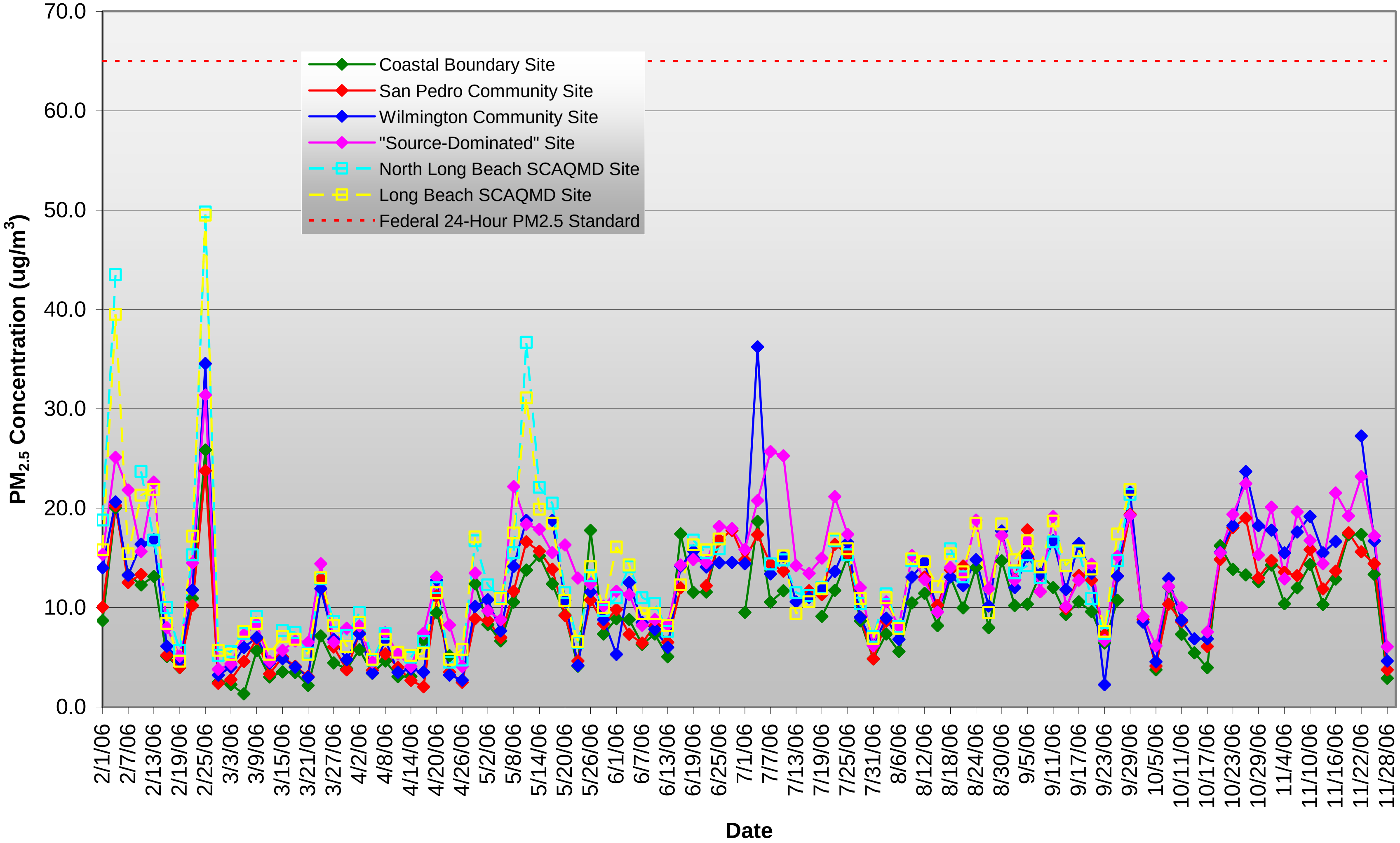
PM2.5

Inner Harbor Stn		N. Long Beach Stn	Outer Harbor Stn	
Date	Max Value	Max Value	Date	Max Value
12/8/2006	55.5	59	12/7/2006	47.1
12/7/2006	52.2	50	11/24/2006	44.5
11/24/2006	46.7	43	12/8/2006	44.3
12/6/2006	43.6	41	12/6/2006	42.8
12/14/2006	43.5		12/27/2006	39.8
11/23/2006	43.3		11/25/2006	38.8
11/25/2006	43.2		12/26/2006	37.9
12/15/2006	42		11/23/2006	37.8
10/26/2006	41.7		11/20/2006	37.3
12/9/2006	41.6		11/21/2006	36.5
11/19/2006	40		12/14/2006	35.2
12/22/2006	39.6		12/15/2006	34.4
12/23/2006	39.6		11/18/2006	32.3
12/24/2006	39.6		12/12/2006	31.9
12/26/2006	39.6		12/13/2006	31.8
12/27/2006	39.6		12/25/2006	31.6
12/31/2006	39.6		11/11/2006	31.3
12/25/2006	39.5		11/22/2006	31.2
12/28/2006	39.5		9/29/2006	30.8
12/29/2006	39.5		11/15/2006	30.8
12/30/2006	39.5		11/10/2006	30.6
10/27/2006	38.7		12/5/2006	30
10/23/2006	36.8		9/28/2006	29.8
11/20/2006	36.8		12/31/2006	29.7

PM10

Inner Harbor Stn		N. Long Beach Stn	Outer Harbor Stn	
Date	Max Value	Max Value	Date	Max Value
11/30/2006	200.2	64	11/30/2006	210.9
11/29/2006	156.1	58	11/29/2006	164.7
10/27/2006	131.8	51	10/27/2006	111.2
10/26/2006	125.3	51	12/1/2006	107.1
12/8/2006	123.3		10/26/2006	105.7
12/7/2006	112.3		12/8/2006	83.1
12/27/2006	103.5		11/7/2006	81.1
12/1/2006	102.8		12/7/2006	79.2
10/28/2006	99.8		10/28/2006	79
12/14/2006	97.6		11/20/2006	77.1
11/7/2006	96.3		12/6/2006	75.3
12/28/2006	94.7		12/3/2006	73.7
12/9/2006	92.3		11/21/2006	73
11/8/2006	89.4		12/2/2006	72.6
12/15/2006	88.9		12/5/2006	72.5
12/5/2006	87.4		11/8/2006	71.8
9/19/2006	87.3		11/11/2006	70.8
12/6/2006	87.3		11/10/2006	69.7
9/18/2006	86		12/27/2006	69.1
11/17/2006	86		11/6/2006	68.4
11/20/2006	85.3		12/14/2006	68.1
11/16/2006	84.4		12/4/2006	66.7
11/11/2006	84.2		10/19/2006	66.2
12/3/2006	83.5		11/16/2006	65.7

$PM_{2.5}$ 24-hr Average Concentrations at the Port of Los Angeles
February 2006-November 2006



Notes: Federal 24-hour $PM_{2.5}$ standard is 65 $\mu g/m^3$.

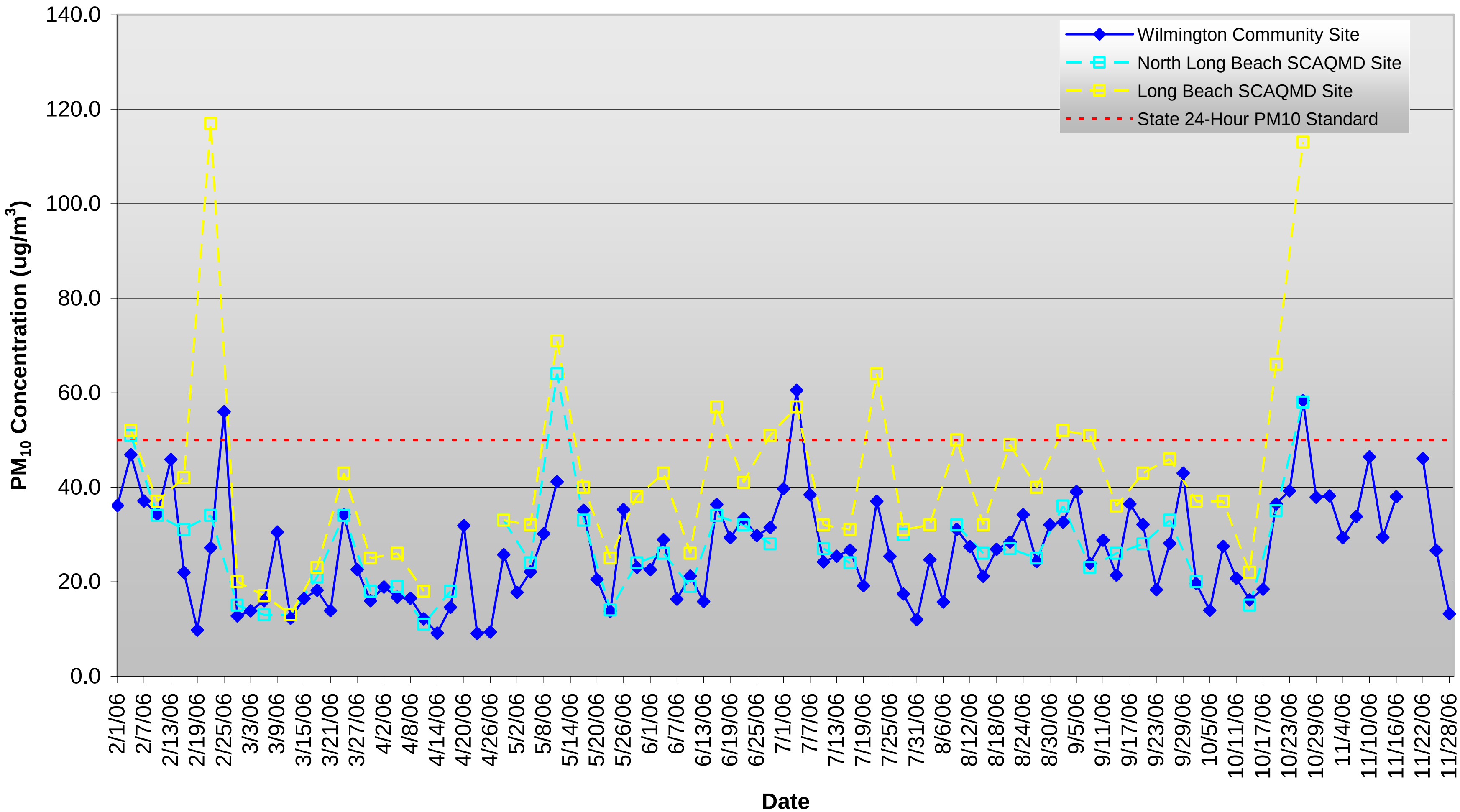
- Longer-term average $PM_{2.5}$ concentrations at the monitoring sites:

Coastal Boundary Site:	9.6	$\mu g/m^3$	10-month average (February-November)
San Pedro Community Site:	10.5	$\mu g/m^3$	10-month average (February-November)
Wilmington Community Site:	11.8	$\mu g/m^3$	10-month average (February-November)
“Source-Dominated” Site:	13.3	$\mu g/m^3$	10-month average (February-November)
SCAQMD N. Long Beach Site:	13.2	$\mu g/m^3$	8-month average (February – September)
SCAQMD Long Beach Site:	13.1	$\mu g/m^3$	8-month average (February – September)

- No $PM_{2.5}$ data currently available from SCAQMD sites after the end of September 2006.
- The “source-dominated” site is located on Terminal Island near the center of Port operations, which include ship, rail, truck and cargo-handling activities.

PM$_{10}$ 24-hr Concentrations at the Port of Los Angeles

February-November 2006



Notes:

- Federal 24-hour PM$_{10}$ standard is 150 μg/m^3.
- State 24-hour PM$_{10}$ standard is 50 ug/m^3.
- Average PM$_{10}$ concentration at Wilmington Community site = 27.0 μg/m^3 (10-month average)
- Average PM$_{10}$ concentration at the North Long Beach SCAQMD site = 27.2 μg/m^3 (8-month average)
- Average PM$_{10}$ concentration at the Long Beach SCAQMD site = 40.4 μg/m^3 (8-month average)